Fracture assessment and management

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Introduction
Up to 70% of all Emergency Department (ED) presentations are musculoskeletal related. All junior doctors will have significant exposure to fractures, whether in ED or on an Orthopaedic rotation. It is essential to have a basic understanding of initial assessment and the management priorities in patients with trauma and fractures.

Case 1 – You are working in the ED as junior doctor and you’re told about the next patient, a “29-year-old male, high speed trauma, obvious deformity to left leg, splint administered by paramedics.” What is your approach?

1. Initial assessment
   - Based on Early Management of Severe Trauma (EMST) principles: ABCDEFG
     - Airway maintenance with cervical spine stabilisation
     - Breathing and ventilation
     - Circulation and haemorrhage control
     - Disability
     - Glucose – DEFG ‘don’t ever forget glucose’
   - Remember to expose patient
   - Quickest way to assess the ABCs is to talk to the patient
     - If they are responsive and verbalising; then airway, breathing and circulation likely intact

2. Outline your assessment approach by the bedside
   - History - AMPLE
     - Allergy and tetanus (ADT vaccine) status
     - Medications – potential interactions, cause for presentation
     - Past medical history – underlying cause for presentation
     - Last meal/drink – fasting status important for potential surgery
     - Events leading up to presentation
   - Examination
     - Closed or open injury?
     - Neurovascular examination
       - Distal to injury
         - Target major nerve distributions
         - Pulses
         - Temperature and capillary refill
         - Ultrasound – useful to assess circulation

3. Describing X-rays
   - Identify film – right patient and location
   - Type of fracture
     - Incomplete
       - Greenstick
       - Bowing – typically paediatric populations
     - Complete
       - Transverse
       - Oblique
       - Spiral
       - Comminuted
- Location
  - Which bone (e.g. femur) and specific part (shaft, head vs. epiphysis, diaphysis)
- Displacement
  - Angulation – distal fragment comparatively to proximal fragment
  - Translation – translation along proximal fragment
  - Rotation
  - Distraction (lengthened)
  - Impaction (shortened)

4. **Rationale and application of back slabs**
   - Immobilisation/splinting is key in management, especially for analgesia (quick and easy)
   - Prevent further damage to structures surrounding fracture – reduce inflammation, fat embolism, oedema
   - Splinting should be above and below the joint
   - Partial splint (back slab) is preferred to complete splint (circumferential casting)

5. **Management and classification of open fractures**
   - Gustilo open fracture classification system
     - Scores I to IIIC
     - Increasing scores represents worse outcomes
   - Clean wound – keeps wound moist, reduce infection
   - Irrigation is controversial
     - Can be done to reduce bacterial load
     - But if wound appears clean, may not need to be done (as can cause damage)
   - Photography of wound useful as can both monitor progress and also minimise need for re-dressing and stress to patient, provided consent obtained

6. **Compartment syndrome**
   - Pain out of keeping with injury is highly suspicious for compartment syndrome
     - E.g. 10/10 pain persisting after opioid administration
   - Risk in both open and closed fractures
   - Devastating clinical damage if not picked up – surgical emergency, clinical diagnosis
   - Monitoring compartment pressures
     - More indicated when patient is intubated or in ICU and clinical examination with “5Ps” not possible
   - “5Ps”
     - Pain (to passive stretch)
     - Paralysis
     - Paraesthesia
     - Palpable swelling (wood hard swelling)
     - Pulses (absent – normally too late)
   - Management: emergency surgery for fasciotomy
   - Complication: gangrene, necrosis, rhabdomyolysis, acute kidney injury, amputation, sepsis, death

7. **Short and long-term complications of fractures**
   - Immediate: swelling, loss of function, hypovolaemic shock, pain
   - Early: neurovascular, visceral, soft tissue injuries, haemothorax, compartment syndrome, wound infection, joint injury, emboli
   - Long term: Malunion, non-union, osteomyelitis, ischaemic contractures from missed compartment syndrome, avascular necrosis (non-long bones – scaphoid and femoral head)

8. **Take home messages**
   - Systematic approach will ensure you do not miss anything
   - Know your anatomy, understand what structures can be damaged
   - Show initiative – ask for help early

Summarised by Dr Dennis Neuen, Intern, Wagga Wagga. June 2018
Useful resources

- Radiopaedia (https://radiopaedia.org/)
- Orthobullets (https://www.orthobullets.com/)
- Bone School (http://www.boneschool.com/)
- Tolerances (Orthopaedic Reference Manual)